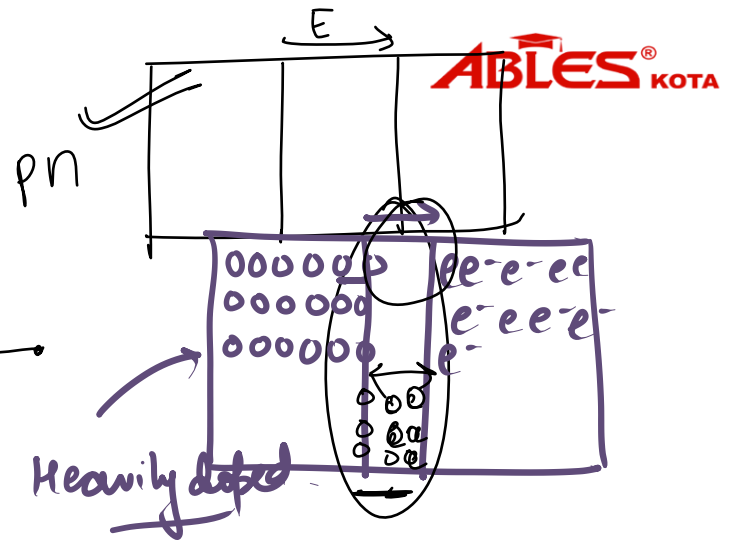
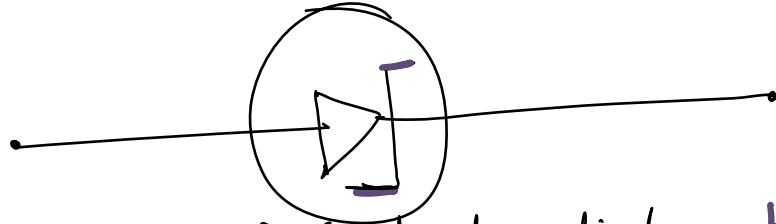


Work as a Filter

- Voltage across capacitor get unceased, capacitor gets charged.
- There is no load resistance, it simply gets charged
- With R, load discharged
- Voltage across R ↓.

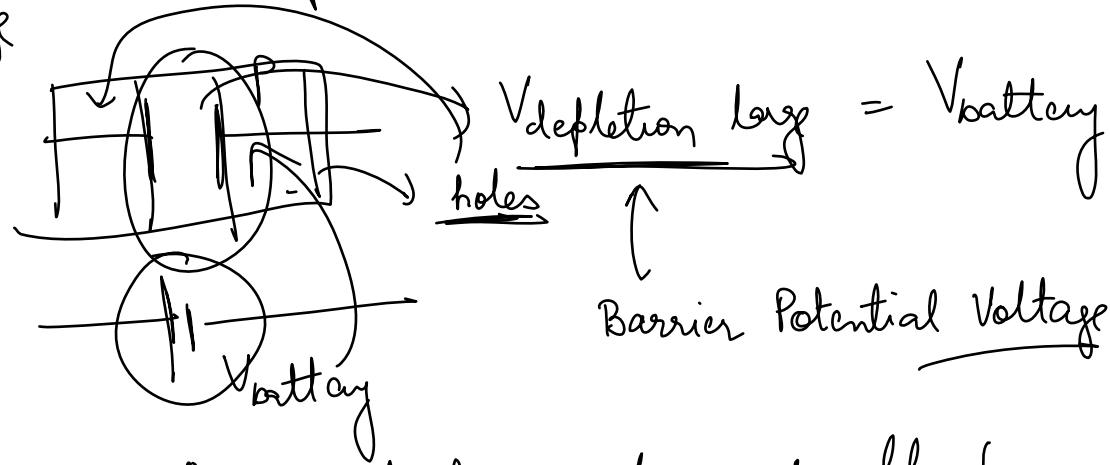
Time Constant = $\frac{1}{RC}$

Zener diode: [Regulator]



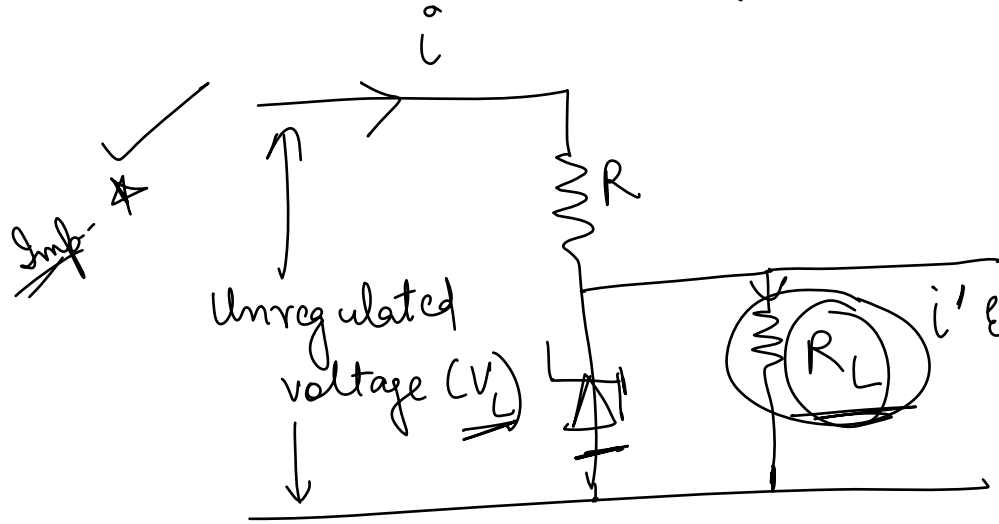
- Special purpose Semi Conductor diode.
- It operates in reverse bias.
- Heavily doped both p & n sides of the junction as compared to normal p-n junction.
- Thin depletion layer (10^{-6} m) - & Electric field = 5×10^6 V/m.

- As Applied reverse bias voltage reaches breakdown voltage of Zener diode, there is large increase in current.



- Zener diode voltage remains constant even for a small change in current. After breakdown, even for large change in current, there is voltage remains constant across the load.

Zener diode as a voltage regulator:



i' → current in the load resistance.

Even if i' ↑ or ↓

Voltage across load resistance would remain constant.

* At the breakdown region,

$$V = V_{\text{Zener diode}}$$

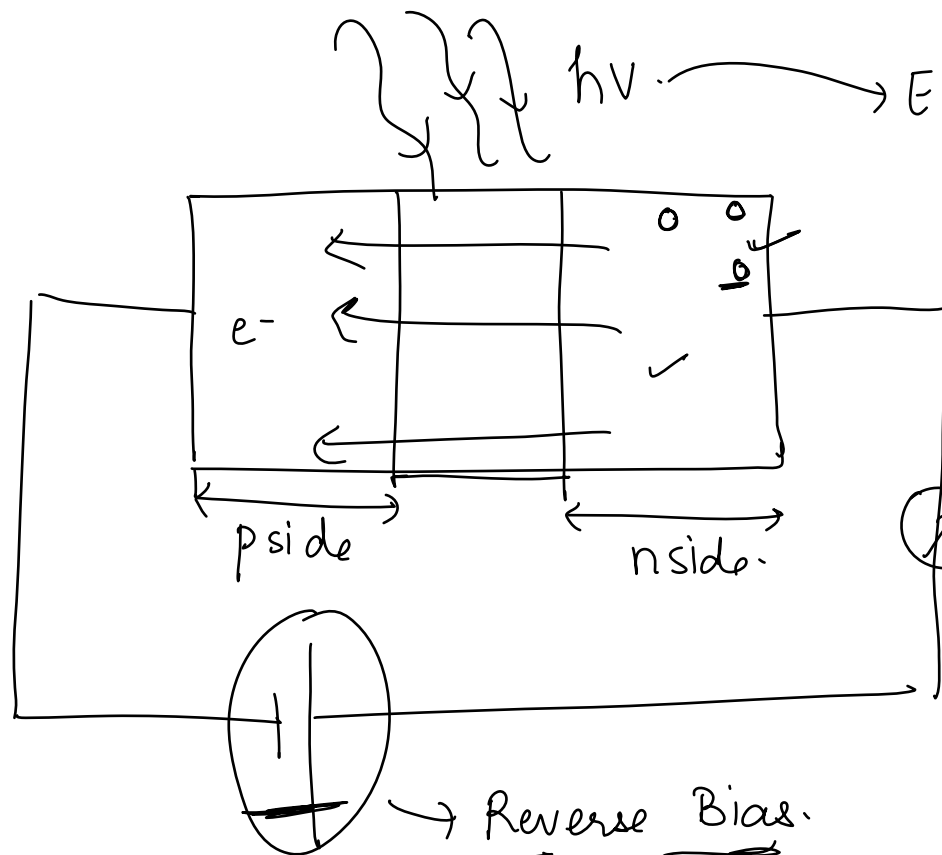
The emission of e^- from the hot atoms due to high emission electric field is known as electric field emission.

Optoelectronic Junction diodes:

Semiconductor devices in which ^{charge} carriers are generated by the photons.
So, these are called optoelectronic devices.

a) Photodiode:

- Special purpose PN junction diode fabricated with transparent window to allow light to fall on the diode-
- Operated in reverse bias -
- Used as photodetector to detect optical signals.



Energy of light $(\frac{hc}{\lambda}) = hv.$

When, $E > E_g$ of semiconductor

Electrons-hole pairs are generated due to the absorption of photons.

- e⁻ reach n side & holes reach p-side.
- Direction of electric field is such that e⁻ reach n side, & holes reach p-side.

Current flow \propto Intensity of light.

Application of Photodiodes:

- 1) Safety Equipments
- 2) Camera
- 3) Sensors.
- 4) optical communication devices.

Light Emitting Diode:

- 1) Heavily doped p-n junction.
- 2) Forward bias emits spontaneous radiation.
- 3) On passing a current through the diode, minority charge carriers and majority charge carriers recombine at the junction. On recombination, energy is released in the photon.

GaAs → Infrared LED.

